



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Interstate Seed Company

Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT OF 1930, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SUNFLOWER

'IS 3401'



In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington this 30th day of July in the year of our Lord one thousand nine hundred and eighty-one.

Attest:

Samuel L. Taylor

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

John R. Block

Secretary of Agriculture

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: See Reverse.

No certificate for plant variety protection may be issued unless a completed application form has been received (5 U.S.C. 553).

1a. TEMPORARY DESIGNATION OF VARIETY IS 3401		1b. VARIETY NAME IS 3401		FOR OFFICIAL USE ONLY PV NUMBER 8100027	
2. KIND NAME Sunflower		3. GENUS AND SPECIES NAME Helianthus annuus		FILING DATE 11/18/80	TIME 11:00 P.M.
4. FAMILY NAME (BOTANICAL) Compositae		5. DATE OF DETERMINATION February 1980		FEE RECEIVED \$ 500.00 \$ 250.00	DATE 11/18/80 7/6/81
6. NAME OF APPLICANT(S) Interstate Seed Co.		7. ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) P O Box 470, Fargo, North Dakota 58107		8. TELEPHONE AREA CODE AND NUMBER 701-235-4431	
9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: (Corporation, partnership, association, etc.) Corporation		10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION North Dakota		11. DATE OF INCORPORATION November, 1917	
12. NAME AND MAILING ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS: Stan Rollin, Seed Consultant, 6802 Orem Drive, Laurel, MD. 20810					

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

☒ 13A. Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)

☒ 13B. Exhibit B, Novelty Statement.

☒ 13C. Exhibit C, Objective Description of the Variety (Request form from Plant Variety Protection Office.)

☒ 13D. Exhibit D, Additional Description of the Variety.

14a. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a). (If "Yes," answer 14B and 14C below.) ☐ YES ☒ NO

14b. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☒ NO

14c. IF "YES," TO 14B, HOW MANY GENERATIONS OF PRODUCTION BEYOND BREEDER SEED? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

15a. DID THE APPLICANT(S) FILE FOR PROTECTION OF THIS VARIETY IN OTHER COUNTRIES? ☐ YES ☒ NO (If "Yes," give name of countries and dates.)

15b. HAVE RIGHTS BEEN GRANTED THIS VARIETY IN OTHER COUNTRIES? ☐ YES ☒ NO (If "Yes," give name of countries and dates.)

16. DOES THE APPLICANT(S) AGREE TO THE PUBLICATION OF HIS/HER (THEIR) NAME(S) AND ADDRESS IN THE OFFICIAL JOURNAL? ☒ YES ☐ NO

17. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

11-12-1980
(DATE)

Morris Abdalla
(SIGNATURE OF APPLICANT)

INSTRUCTIONS

GENERAL: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and \$500 fee (\$250 filing fee and \$250 examination fee) to U.S. Dept. of Agriculture, Agricultural Marketing Service, Livestock, Poultry, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (See section 180.175 of the Regulations and Rules of Practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

ITEM

- 5 Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.
- 13a Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.
- 13b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.
- 13c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.
- 13d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as, plant habit, plant color, disease resistance, etc.
- 14a If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "NO," he may change his choice. (See section 180.16 of the Regulations and Rules of Practice.)
- 15a See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.

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Interstate Seed Co., Fargo, N.Dak.
Appl. No. 8100027
Sunflower inbred line IS3401

13.a Exhibit A. Origin and breeding history

1. Pedigree RHA274 // HS-90 / IS8944
Origin of each of the previous parents=

a. RHA274

RHA274 is a recessive branching restorer line that was jointly released in 1974 by the United States Department of Agriculture and North Dakota State University, Agricultural Experiment Station, Fargo, N.Dak. (Enclosed is a copy of the original release). The line has been extensively used for hybrid seed production.

b. HS-90

HS-90 is a Romanian hybrid that was introduced in the U.S. for testing in 1976 and 1977. Enclosed is the 1977 FAO sunflower variety trial conducted by the USDA and was planted in Casselton, N.Dak. We have seed of the hybrid if needed.

c. IS8944

IS8944 is a three-way hybrid and has been in commercial production since 1975. The pedigree of 8944 is (CMSHA89 X HA234) X RHA274. The three component of the hybrid are USDA releases and a copy of the release is enclosed.

2. Breeding methodology used to derive IS3401:

IS3401 was derived from the fourth generation of the cross mentioned previously. The pedigree and selection methods were used. Selection for recessive branching, early maturity, disease resistance and total pollen grain production was applied in each breeding generation. Seedlings of the F3 and F4 families were tested for downy mildew and homozygous resistant families were selected. In our disease nursery at Hunter, N.Dak the F3 and F4 populations were screened for adult plant resistance to verticillium wilt caused by the fungus Verticillium dahliae.

A test cross of the F4 generation to several cytoplasmic male sterile lines was used to screen populations for fertility restoration and to test for combining ability - Selected homozygous F4 families were used to make the breeder seed increase of IS3401.

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Sunflower inbred line IS3401
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3. Stability and Variants:

During the foundation seed increases of IS3401 it appeared to be uniform for the recessive branching character. No single headed plants were observed in locations at Homestead, FL, and Hendrum, MN. We have observed a low frequency of slightly taller plants. The previous variants were ranging in height from one to three inches taller. Percentage of variants are shown in the following table.

Table 1. Percentage of variants in
sunflower inbred line IS3401

Year and Location	No. of plants observed	No. of Variants	% of Variants
1980, Homestead, FL	22,000	13	0.059
1980 Hendrum, MN	12,000	9	0.075

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Sunflower inbred line IS3401

8100027

13-b. Exhibit B. Novelty Statement

IS3401 is most similar to RHA274 differing in:

1. IS3401 has shown to be more verticillium wilt resistant in the Red River Valley of North Dakota than RHA274. The data that we have collected from our disease nursery in Hunter, ND are shown in the following table.

Table 1. Verticillium wilt reactions of sunflower inbred lines IS3401 and RHA274 in the disease nursery at Hunter, N.Dak.

Year	Inbred Line	Total Plants	Verticillium Reactions		
			Healthy & Mild %	Moderate %	Severe & Dead %
1979	RHA274	140	47	13	40
	IS3401	158	93	7	0
1980	RHA274	150	38	25	37
	IS3401	165	90	8	2

2. IS3401 has shown to be from 7 to 10 days earlier in bloom than RHA274. It has also shown that it finishes blooming later than RHA274, in other words, the number of days from 1st bloom to last bloom is longer for IS3401 than RHA274. The latest criteria is very important in hybrid seed production. The following table shows the number of days from emergence to 1st and last bloom of both IS3401 and RHA274 at different locations and different years.

Interstate Seed Co., Fargo, N.Dak.
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Table 2. No. of days from emergence to bloom
 for sunflower inbred lines RHA274 and IS3401

Year and Location	Inbred Line	# days to 1st bloom	# days to last bloom	Total No. of days in bloom
1979 Casselton, ND	RHA274	67	78	11
	IS3401	57	76	19
1979 Hunter, ND	RHA274	64	73	9
	IS3401	58	72	14
1980 Glyndon, MN	RHA274	68	80	12
	IS3401	59	72	13
1980 Hunter, ND	RHA274	62	71	9
	IS3401	54	68	14

3. IS3401 has shown to produce more side flowers than RHA274. The following table shows the difference in the number of side flowers for each line in different locations.

Table 3. Average number of side flowers
 of sunflowers inbred lines RHA274 and IS3401

Year and Location	RHA274		IS3401	
	# of plants	Ave. # of side flowers	# of plants	Ave. # of side flowers
1979, Casselton, ND	10	15.7	13	22.8
1979, Hunter, ND	8	16.3	12	20.8
1980, Glyndon, MN	12	15.5	14	22.6
1980, Hunter, ND	7	16.4	10	20.0

SUNFLOWER INBRED LINE IS 3401

13 B. Exhibit B = Novelty Statement

IS 3401 is most similar to RHA 274 differing in:

1. IS 3401 has shown to be verticillium wilt resistant in the Red River Valley; whereas, RHA 274 is susceptible.
2. IS 3401 has shown to be from seven (7) to ten (10) days earlier than RHA 274. (See attached pictures)
3. IS 3401 produces from 10% to 15% more side branches with flowers than inbred line RHA 274.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(SUNFLOWER)

OBJECTIVE DESCRIPTION OF VARIETY
SUNFLOWER (*HELIANTHUS ANNUUS*)

NAME OF APPLICANT(S)

Interstate Seed Company

VARIETY NAME OR TEMPORARY DESIGNATION

IS 3401 Inbred Line

ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code)

FOR OFFICIAL USE ONLY

PVPO NUMBER

P O 470, Fargo, North Dakota 58107

8100027

Place numbers in the boxes (e.g.) for the characters that best describe typical plants of this variety. The symbol ▲ indicates decimal.

COMPARISON VARIETIES

NON-OIL: 1 = ARROWHEAD

2 = MINGREN

3 = SUNDAK

OIL: 4 = PEREDOVIK

5 = KRASNODARETS

6 = OTHER

RHA 274 Inbred Line

1. CLASS:

1 = OIL TYPE 2 = NON-OIL TYPE (confectionery)

2. MATURITY:

NO. OF DAYS TO HEAD FIRST VISIBLE
(from emergence)

NO. OF DAYS TO HARVEST RIPENESS (from emergence)

DAYS EARLIER THAN

DAYS EARLIER THAN

HEADING SAME AS

COMPARISON
VARIETY

MATURITY SAME AS

COMPARISON
VARIETY

DAYS LATER THAN

DAYS LATER THAN

3. HEIGHT:

cm TALL AT HARVEST RIPENESS

cm SHORTER THAN

SAME AS

COMPARISON
VARIETY

cm TALLER THAN

4. STEM:

LENGTH OF INTERNODE AT HARVEST RIPENESS

NUMBER OF LEAVES

CM. SHORTER THAN

FEWER LEAVES THAN

SAME AS

COMPARISON
VARIETY

SAME AS

COMPARISON
VARIETY

CM. LONGER THAN

MORE LEAVES THAN

BRANCHING:

1 = NO BRANCHING

3 = TOP BRANCHING (with central head)

2 = BASAL BRANCHING

4 = FULLY BRANCHED (without central head)

COLOR OF GROWING POINT: 1 = GREEN 2 = YELLOW

8100027

5. LEAVES (Midstem at flowering):

 CM. BLADE LENGTH1 CM. BLADE WIDTH CM. SHORTER THAN CM. NARROWER THAN

LENGTH SAME AS

COMPARISON
VARIETY

WIDTH SAME AS

COMPARISON
VARIETY CM. LONGER THAN CM. WIDER THAN WIDTH: LENGTH RATIO: 1 = NARROWER THAN LONG 2 = EQUAL 3 = WIDER THAN LONG LEAF SHAPE: 1 = CORDATE 2 = OTHER _____ LEAF APEX: 1 = ACUMINATE 2 = OTHER _____ LEAF BASE: 1 = AURICULATE 2 = TRUNCATE LEAF MARGIN: 1 = ENTIRE 2 = FINELY CRENATE 3 = COARSELY CRENATE 4 = OTHER _____ DEPTH OF MARGIN INDENTATIONS: 1 = SHALLOW 2 = INTERMEDIATE 3 = DEEP ATTITUDE: 1 = ERECT 2 = ASCENDING 3 = HORIZONTAL 4 = DESCENDING SURFACE: 1 = SMOOTH 2 = CRINKLED (*ridged*) 3 = OTHER _____ COLOR: 1 = LIGHT GREEN 2 = GREEN 3 = DARK GREEN 4 = BROWN MARGIN COLOR: 1 = GREEN 2 = YELLOW

6. HEAD AT FLOWERING:

 RAY FLOWERS: 1 = ABSENT 2 = PRESENT RAY FLOWER COLOR: 1 = YELLOW 2 = SULFUR YELLOW 3 = ORANGE YELLOW 4 = OTHER _____ DISK FLOWER COLOR: 1 = YELLOW 2 = RED 3 = PURPLE ANTHOCYANIN IN STIGMAS: 1 = ABSENT 2 = PRESENT POLLEN COLOR: 1 = WHITE (*colorless*) 2 = YELLOW PAPPI: 1 = GREEN 2 = RUST (*red*) MM. RAY LENGTH MM. RAY WIDTH MM. SHORTER THAN MM. NARROWER THAN

SAME AS

COMPARISON
VARIETY

SAME AS

COMPARISON
VARIETY MM. LONGER THAN

MM. WIDER THAN

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7. HEAD AT SEED MATURITY:

8100027

1 1 0

CM. DIAMETER

0 1 0

CM. NARROWER THAN

6

SAME AS

COMPARISON VARIETY

CM. WIDER THAN

2

RECEPTACLE SHAPE: 1 = FLAT 2 = CONVEX 3 = CONCAVE

3

HEAD ATTITUDE: 1 = VERTICAL (*erect*) 2 = ASCENDING 3 = HORIZONTAL 4 = DESCENDING

0 9 5 0

NO. OF SEEDS PER HEAD

0 7 5

SEEDS / HEAD LESS THAN

6

SEEDS / HEAD SAME AS

COMPARISON VARIETY

SEEDS / HEAD MORE THAN

8. SEEDS:

3

OUTER PERICARP: 1 = CLEAR 2 = STRIPED BLACK 3 = NEARLY SOLID BLACK

1

MIDDLE PERICARP: 1 = WHITE 2 = SOLID PURPLE

1

INNER PERICARP (*seed coat*): 1 = NO COLOR 2 = BROWNISH BLACK

4

STRIPES: 1 = ABSENT 2 = EVEN BLACK & WHITE STRIPES 3 = BROAD BLACK & NARROW WHITE

4 = BLACK WITH NARROW DARK-GREY STRIPING 5 = OTHER

1

MOTTLING: 1 = ABSENT 2 = PRESENT

1

SHAPE: 1 = OVATE 2 = OBOVATE (*shield*) 3 = NARROWLY OBOVATE 4 = OBLONG 5 = ELLIPTIC

2

SHAPE (*cross-section*): 1 = NOT CURVED 2 = CURVED

0 9 6

MM. LENGTH

0 4 4

GM. / 100 SEED

MM. SHORTER THAN

GM. LIGHTER THAN

SAME AS

COMPARISON VARIETY

SAME AS

COMPARISON VARIETY

0 2 2

MM. LONGER THAN

6

0 1 8

GM. HEAVIER THAN

6

0 0 0

% HELD ON 7.9 MM. (20/64) ROUND-HOLE SCREEN

% LESS THAN

SAME AS

6

COMPARISON VARIETY

% MORE THAN

9. DISEASE AND INSECTS (0 = Not tested, 1 = Susceptible, 2 = Resistant):

☒ 2 RUST (*Puccinia helianthi*)GIVE RACES: Race 1☒ 2 VERTICILLIUM WILT (*Verticillium dahliae*)☒ 2 DOWNY MILDEW (*Plasmopara halstedii*)☒ 0 WHITE BLISTER RUST (*Albugo tragopogi*)☒ 0 BROOM RAPE (*Orobanche cannis*)

GIVE RACES: _____

☒ 0 EUROPEAN SUNFLOWER MOTH (*H. nebullela*)☐ OTHER (specify) _____☒ 1 SCLEROTINIA WILT (*Sclerotinia sclerotiorum*)☒ 2 LEAF MOTTLE (*V. albo-atrum*)☒ 1 GRAY-MOLD BLIGHT, BUD ROT (*Botrytis cinerea*)☒ 1 CHARCOAL ROT, STEM ROT (*Macrophomina phaseolina*)☒ 1 SUNFLOWER MOTH, N. AMERICAN HEAD MOTH
(*Homoeosoma electellum*)☐ OTHER (specify) _____☐ OTHER (specify) _____

10. GIVE VARIETY OR VARIETIES THAT MOST CLOSELY RESEMBLE THE SUBMITTED VARIETY. For the following characteristics

indicate degree of resemblance by placing in the column marked, D.R., one of the following numbers:

1 = Submitted variety is less, lighter or inferior than comparison variety 2 = Same as 3 = More than, darker, or superior

CHARACTER	VARIETY	D.R.	CHARACTER	VARIETY	D.R.
Frost resistance	6	2	Leaf attitude	6	2
Lodging resistance	6	2	Head attitude	6	2
Neck or stem strength	6	2	Ray flower color	6	2
Branching type	6	2	Seed shape	5	2
Petiole length			Seed color	6	1
Leaf shape	6	2	Seed striping pattern	4	2
Leaf color (green)	6	2	Seed yield	6	3

11. GIVE THE FOLLOWING DATA FOR SUBMITTED AND A SIMILAR VARIETY*.

VARIETY	HULL (%)	PROTEIN (%)	OIL (%)	IODINE NO.	FATTY ACIDS	
					OLEIC (%)	LINOLEIC (%)
Submitted RHA-274	5/2/81	17.50	41.10	131	16.2	74.5
Similar Submitted		20.60	39.30	130	9.36	83.61
Name of similar variety						

* Hull, protein and oil percentages expressed for whole undecorticated seed; acids expressed as percentages of oil

12. COMMENTS:

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